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CASE REPORT

A Rare Case Report of Extra Medullary Hematopoiesis in Lung in a Case of Thalassemia

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ABSTRACT

*In thalassemia ineffective red cell production by the bone marrow (ineffective erythropoiesis) forces expansion of the hematopoietic tissue outside the marrow medulla and leads to hematopoietic compensatory involvement, mostly in the form of masses, of other regions in the body, the phenomenon termed extramedullary hematopoiesis (**EMH**). So ineffective erythropoiesis in patients with thalassemia drives extramedullary hematopoietic tumor formation in several parts of the body. EMH is most often seen in reticuloendothelial organs like spleen, liver or lymph node and rarely seen in lung parenchyma. Here, we are reporting a case of 32 yrs male presented with the complain of fatigue, pallor, breathlessness, with history of b thalassemia, diagnosed as EMH in lung. Computed Tomography (**CT**) of chest showed bilateral masses at the lower lobe of both lung. The masses initially diagnosed as neoplastic lesion radiologically. CT Guided fine needle aspiration cytology of the mass confirms pulmonary extramedullary hematopoiesis.*

***Keyword**: Extramedullary hematopoiesis, myeloproliferative disorders, myelofibrosis*

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INTRODUCTION

Extramedullary haematopoisis is a response to insufficient blood cell production by production of blood elements outside the bone marrow.[1] Extramedullary hematopoiesis is most often seen in reticuloendothelial organs specially spleen, liver, or lymph nodes, and it is rarely seen in lung parenchyma.[2] Almost all reported cases of pulmonary extramedullary hematopoiesis occurred following myeloproliferative disorders specially myelofibrosis.[3] Other less common underlying causes are hemolytic anaemia, hereditary spherocytosis, thalassemia syndromes , other hemoglobinopathies, etc.[4]

Thalassemia was defined as a clinical entity in 1925 by Dr. Thomas B. Cooley at the annual meeting of the American Pediatric Society where he presented five young children with severe anaemia, splenomegaly and peculiar bone abnormalities.[5] The b-thalassemias are a group of autosomal recessive disorders characterized by absence or reduced synthesis of the red cell b-globin chains. As a group, they are the most common single gene disorder in the world and are found at high frequencies in many populations worldwide.[6] Extremely diverse phenotypes exist within the homozygous and compound heterozygote states for b-thalassemia. The terms thalassemia major (TM) and thalassemia intermedia (TI) lack specific molecular correlates, but encompass a wide spectrum of clinical, as well as laboratory abnormalities.[7] At the severe end of the spectrum are patients whose clinical course is characterized by profound anemia, who present to medical attention in the first year of life, and who subsequently require regular transfusions for survival, the condition known as TM.[8] But many patients with inheritance of two mutant beta alleles have a milder illness, with a broad

range of severity including, at least in early childhood, a virtually asymptomatic state. Patients in this group who present to medical attention in later childhood and remain largely transfusion-independent are said to have TI.[2] However, transfusion-independence in TI does not come without its own side effects. Ineffective red cell production by the bone marrow (ineffective erythropoiesis) forces expansion of the hematopoietic tissue outside the marrow medulla and leads to hematopoietic compensatory involvement, mostly in the form of masses, of other regions in the body—the phenomenon termed extramedullary hematopoiesis (EMH).[9] So, ineffective erythropoiesis in patients with thalassemia drives extramedullary hematopoietic tumor formation in several parts of the body.

Among the various body regions reported, lung involvement is very rare.[10] Intrathoracic EMH is a rare condition that is often located in the posteroinferior mediastinum and is usually asymptomatic. Clinically, it is important to distinguish masses caused by EMH from other lesions involving the posterior mediastinum.

Intrathoracic EMH, particularly posterior mediastinal EMH, is a rare condition that was first described during an autopsy in 1912.[11] The majority of Intrathoracic EMH masses are usually asymptomatic and can be found by microscopic examination, however, occasionally they lead to tumor-like masses, as presented in the current case. Furthermore, Intrathoracic EMH may cause serious complications, including a massive hemothorax, symptomatic pleural effusion, chylothorax or spinal cord compression.[12-14] As the manifestation is variable, it is difficult to distinguish EMH from other mediastinal tumors, mainly when the underlying hematologic disease is as yet undiagnosed. For posterior mediastinal masses, such as those identified in the present case, neurogenic tumors, lymphomas, paravertebral abscesses, extra pleural cysts, primary and metastatic malignant neoplasms and mediastinal lymph node hyperplasia must be considered in the differential diagnosis of Intrathoracic EMH.[15]

Pathophysiology of extramedullary hematopoiesis

Extramedullary hematopoiesis is a physiological compensatory phenomenon occurring because of insufficient bone marrow function that becomes unable to meet circulatory demands. Almost all body sites may be involved including the spleen, liver, lymph nodes, thymus, heart, breasts, prostate, broad ligaments, kidneys, adrenal glands, pleura, retroperitoneal tissue, skin, peripheral and cranial nerves, and the spinal canal.[10] These sites are believed to normally engage in active hematopoiesis in the fetus during gestation. This pathway normally stops at birth, but the extramedullary hematopoietic vascular connective tissues retain the ability to produce red cells under conditions of longstanding ineffective erythropoiesis.[8]

It is usually unnecessary to treat patients with TEMH, with the exception of symptomatic patients. Since extramedullary hematopoietic tissue is highly radiosensitive at relatively small doses, radiotherapy has been indicated to be an effective method for controlling symptomatic spinal cord compression and hemothorax, while surgical treatment is reserved for immediate symptomatic relief. It has also been reported that the surgical resection of EMH may cause further deterioration of anemia and promote hematopoietic behavior in other areas. Therefore, it is important to determine a correct pre-operative diagnosis to avoid unnecessary surgical trauma and improve prognosis.

Here, we are reporting a 32 year old male with history of thalassemia presented with extramedullary hematopoiesis in lung.

CASE HISTORY

A 32 yrs male with history of thalassemia presented with the complain of fatigue, pallor, breathlessness. Chest examination revealed mild wheezing in both lung regions and decreased breath sounds at both the lung base.

Laboratory tests: The whole blood count showed a hemoglobin level of 8 g%, a red blood cell count of 3.8×10^{12}/l, a mean corpuscular volume of 84.6 fl, a mean corpuscular hemoglobin level of 30.1 pg, a total leukocyte count of 5.3×10^{9}/l and a platelet count of 180×10^{9}/l. Peripheral blood smear showed microcytic

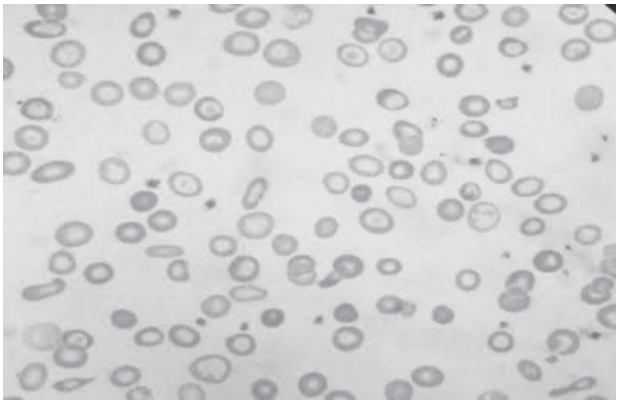

Figure 1 PBS shows hypochromic anemia and target cell

Chest X-ray and contrast-enhanced Computed Tomography of chest showed bilateral masses resembling neoplastic lesion at the lower lobe of both lungs. The size of the masses is (11 x 13) cm on the right side and (13.5 x 15) cm on the left side respectively. With the presumptive diagnosis of malignancy fine needle aspiration under guide of CT was performed.

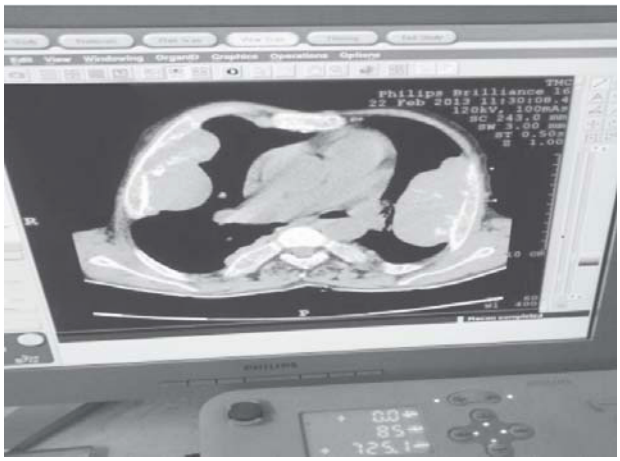

Figure 2 Contrast-enhanced CT of chest showed large mass at the lower lobe of both lungs

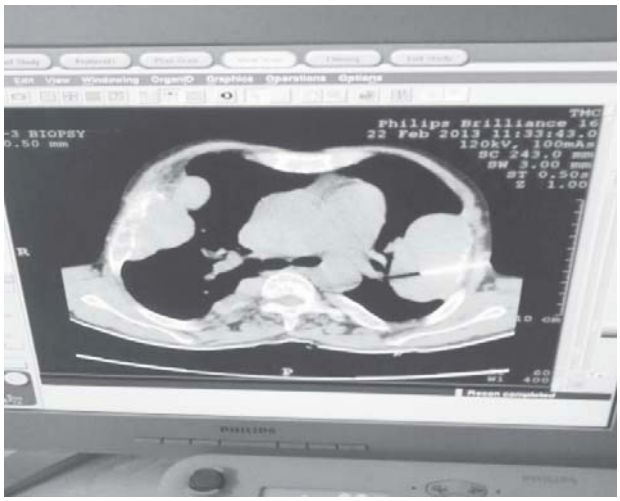

Figure 3 CECT shows needle inside the mass

The smears were subsequently stained using routine MGG stain. The microscopic examination revealed hypercellular smears composed of islands of erythroid precursors, myeloid series (**Figure 4**), and some mature and immature megakaryocyte (**Figure 5**), thus confirming extramedullary hematopoiesis.

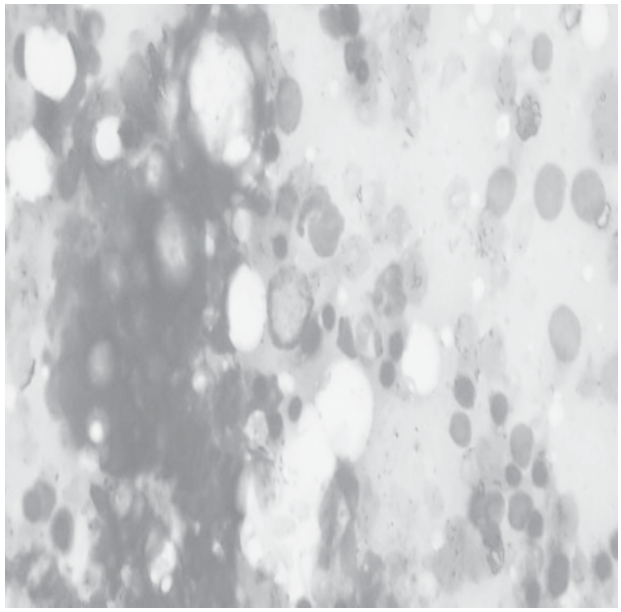

Figure 4 FNAC shows hyper cellular smear composed of islands of erythroid precursors and cells of myeloid series

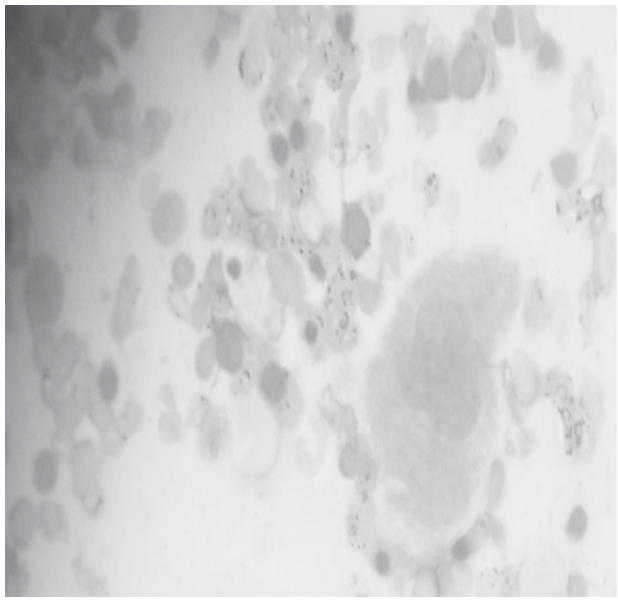

Figure 5 Megakaryocyte in FNAC smear

DISCUSSION

Morteza Hassanzadeh reported a case with beta-thalassemia intermedia who had undergone splenectomy presented with pulmonary extramedullary hematopoiesis.[9] Kumar et al. reported a case of pulmonary extramedullary hematopoiesis presented with lung mass which was diagnosed by fine needle aspiration cytology.[4] In another

study Hsu et al. explained a case of extramedullary hematopoiesis mimicking metastatic lung carcinoma. The patient presented with a left lower lobe lung carcinoma and left pleural masses, initially thought inoperable metastatic disease radiographically but fine needle aspiration of pleural masses revealed extramedullary hematopoiesis.[5] Pandit et al. in another study showed the significance for mobilization of hematopoietic progenitor cells in allergic inflammation localized in the lung parenchyma of asthmatic patients. The progenitor cells are mobilized from bone marrow and migrate to lung parenchyma.[6]

CONCLUSION

Extramedullary hematopoiesis of lung parenchyma can be mistaken for lung neoplasm radiologically. By performing CT guided FNAC the definite diagnosis of pulmonary extramedullary hematopoiesis in a case of thalassemia was made. A correct diagnosis can thus aid in avoiding unnecessary surgical intervention, particularly in an asymptomatic patient. Although previous reported cases occurred with myelofibrosis, we are reporting the rare case of thalassemia associated extramedullary hematopoiesis in lung.

Conflict of interest: No conflict of interest associated with this work.

Declaration of author: Due consent was taken.

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